# DISTRIBUTION AND WINTERING OF COMMON CRANES IN SPAIN 1979/2019


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## The historical evolution of the Spanish wintering population

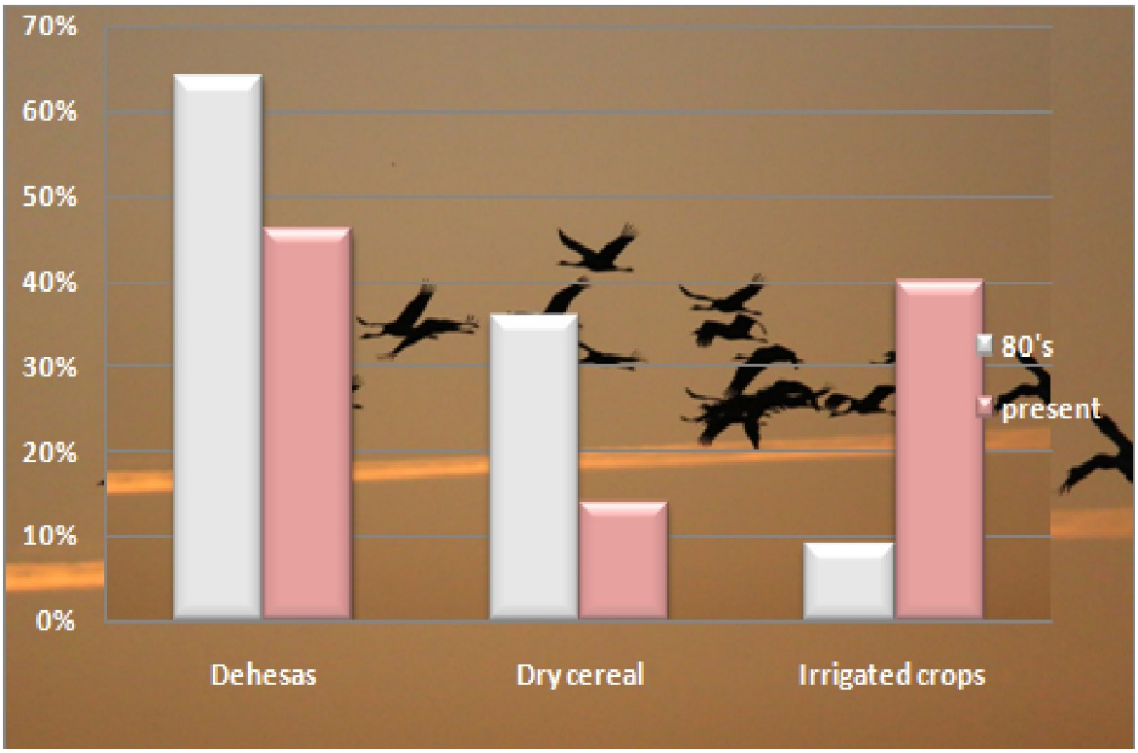
The Iberian Peninsula has traditionally welcomed wintering European cranes. These were mainly spread through dehesas, around marshes and lagoons in south-western Iberia, thanks to the excellent climate and the availability of food resources they favoured in winter. They took advantage of the cereal stubbles and recent sowings of cereals, legumes and grasses, where they looked for bulbs, anthills etc. They ate acorns in the second part of the winter.

A family of cranes feeding on acorns in dehesa, south-western Badajoz.

The transformation of the Vegas del Guadiana began at the start of the 1960s, and more than 100,000 hectares of grassland and dehesa were destroyed to make them into irrigated land, initially dedicated for fruit-growing, giving way to crops of maize and rice. At first the cranes were forced to move to traditional crops in peripheral areas, but soon these changes appealed to their feeding tastes, and in the first 20 years of the 21$^{st}$ Century there was a significant change in their distribution in this and adjacent areas which concentrate the majority of wintering cranes in the Peninsula in winter.

In the 1980s, 64% of the wintering cranes in Spain were in holm oak dehesas and the remaining 36% were divided between rain-fed cereals (91%) and just 9% used irrigated crops (Alonso *et al* 1990). Almost 40 years later, 46% are in dehesas and 40% in irrigated crops, and just 14% are found in rain-fed crops (Graphic no.1). It is no surprise that the percentages differ between autonomous regions with their different

landscapes. For example, in Castilla y Léon 39% are found in dehesas in December and 36% in January, while in Castilla-La Mancha these percentages are 43% and 57% respectively; in Extremadura the dehesas are used by 64% and 61% respectively and finally, in Andalucía, the percentage of the wintering population seen in dehesas is 30% and 38% respectively in December and January. Nevertheless, the holm oak dehesa remains a significant resource for cranes, as in dry years the stubbles are worked and ploughed, losing significant food resources so they turn to the dehesas for resources. Apparently, during these census years, the populations linked to dehesas appear to have remained stable over the years, apart from those close to the Central Zone of Extremadura.




Graphic no.1: Crane distribution by feeding habitat in Spain 1980/2019.

Francisco Bernis estimated that the wintering population of cranes, especially in the dehesas of Badajoz and Cáceres, was between 5,000 and 15,000 in 1966. In the 1970s, the Iberian Peninsula was the wintering destination for up to 95% of the western European population of cranes (Fernández Cruz 1980) while the rest went to northern Africa. In the Peninsula, the majority of cranes were distributed across the south-western regions, where the best Iberian dehesas were found. The intense agricultural transformation which happened in Spain and Europe in the second half of the 20$^{th}$ Century produced an increased area dedicated to irrigated crops, with an ever-increasing presence of maize, amongst others, which led to a radical change in habitat use by the cranes, as they increasingly began to use the stubble fields, altering the distribution of the wintering areas in the final decades. Additionally, global warming has produced winters that are increasingly milder and shorter, with less frost and shorter periods with snow in central and northern Europe. As a result, cranes began

changing their winter distribution and started to winter in France, then in Germany. The latter have significantly reduced the distance they migrate, as in the 1970s and 80s they were moving up to 2,000km while now they are only going around 600km on average, wintering at latitudes ever closer to their breeding areas (Prange 2015). This means that the Iberian Peninsula now only hosts 70% of this population, while the remaining 30% are mostly staying in France and a minority in Germany, although the figures vary each winter, such that in some winters around 55% of the western population have wintered in Spain, with the rest in France.

According to Sánchez *et al* (1993) wintering is influenced by three factors:

1) The availability of food. Obviously the availability of feeding resources is the primary key for maintaining a healthy population of birds. As these are consumed the cranes move on in search of food in other nearby areas throughout the winter (intra-winter movements - Fernández Cruz 1982), some places may remain empty.
2) The quality of the roost. Over these decades we have verified that a good roost site (quiet and stable) is fundamental during the winter. These vary from flooded ground to pools and small reservoirs. The construction of big reservoirs in the 1960s provided the cranes with many kilometres of shoreline for resting on, although fluctuating water levels produce significant changes in distribution or flock size.
3) The level of disturbances also influences the distribution and length of stay for cranes in particular zones. Currently, this level has been increasing significantly as each year there are more people in the countryside, in all kinds of vehicle or on foot, repeatedly bothering the birds in feeding areas and even at roosts.

## Censuses during the winter

What we can consider to be the first winter crane census in Spain was done in 1979, for the project "Grus" (Fernández Cruz 1982), in which 122 volunteer ornithologists took part and 2,886 ICONA rangers were surveyed (although only 24% of them replied to the questionnaire). Six counts were done throughout the season, which gave a final total of 14,721 cranes (a fifth from those censuses). These figures were adjusted to Bernis´ estimates (1960 & 1966) of around 15,000 cranes, as between 1960 and 1980 the population wasn´t growing as it is now.

The final total obtained was probably underestimating the true size of the winter population, despite the excellent effort made by the participants and the coordinator. The reason for underestimating the size of the population could be that in the 1979 census the focus was on what was known at the time: in Extremadura (28 locations), Andalucía (6 locations), Castilla-La Mancha (4 locations), Castilla y León (1 location) and Aragón (1 location). Only in Extremadura can we consider that a sufficiently complete census was done, with 9,184 birds counted. In Andalucía there was good coverage in the dehesas in northern Córdoba province, Seville´s surroundings, La Janda, Fuente de Piedraand the Doñana area, where 3,384 cranes were counted. Only 217 birds were

counted in Castilla y León, at the El Oso lagoon (the Salamanca population was not yet known). In Castilla-La Mancha they counted at El Hito lagoon, Rosarito (although at that time this population was included in Extremadura, as the cranes spread through Extremaduran dehesas) and some lagoons in Ciudad Real and Guadalajara, not finding the populations of Las Tablas de Daimiel nor Cabañeros, obtaining a figure of 412 birds. Finally, in Aragón, only the birds at Gallocanta were reported, with a total of 409 individuals.

However, during migration at this lagoon and by adding the numbers obtained from 20th February at 5-day interval censuses (bearing in mind they arrive in the evening and usually leave the next day if the conditions are good, which we have factored for), we can estimate that at least 25,000 cranes could have gone via the lagoon (1,000 estimated in Portugal and fewer coming from Morocco). To this we can add birds that went without stopping here, which were those going via The Basque Country (387 by Álava and 2,129 by Gipuzkoa); Burgos (2,101) León (354) and those using the Mediterranean corridor: Castelló (4), Balearic Isles (6) and Barcelona (22), so the total would probably be about 30,000 individuals wintering in Spain. In summary, it is feasible that in 1979 at least double the number of cranes wintered in the Iberian Peninsula than were censused.

A second "Grus" project (Araujo 1987) ran in 1981, which raised the number to 17,000 cranes, and in 1986 17,240 were estimated (Fernández Cruz *et al* 1987).However, the Alonso brothers estimated the Iberian population at 31,985 in 1985, based on the Gallocanta censuses (Alonso *et al* 1986); it is clearly impossible that the growth rate of the crane population (1.2 chicks per breeding pair, without considering juvenile mortality) could double the wintering population un five years. This is another reason to show that the first census underestimated the quantity of wintering cranes.

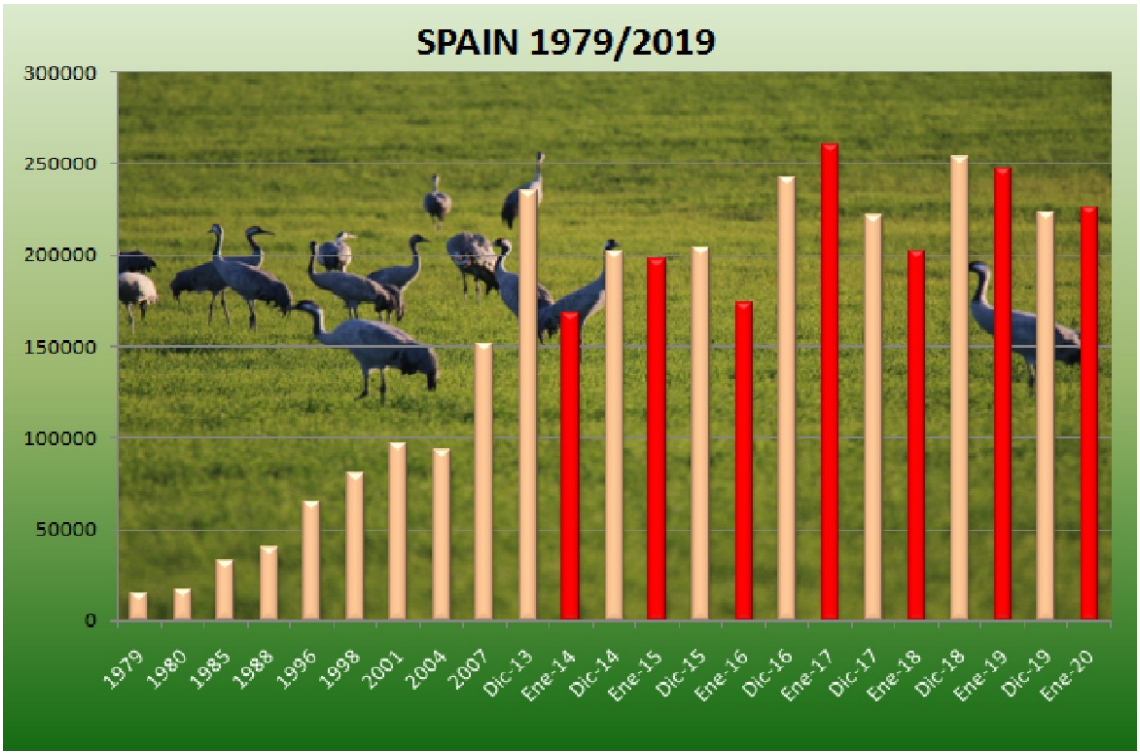
39,573 cranes were censused in the second national census, in 1988 (Muñoz-Pulido *et al* 1989), although the population was estimated to be between 50,000 and 60,000 birds. The censuses were done: 27/28 November, 8/9 January and 26/27 February, in which 61 locations in Spain and 4 in Portugal were visited and 153 people collaborated. In Aragón, the Sotonera reservoir (HU) was censused for the first time and a new location was described: Las Saladas de Alcañiz(TE). Continual monitoring of migration movements was done at Gallocanta lagoon, where they obtained maximum counts of 50,768 and 51,466 on 6 and 10 November 1988 and 54,114 on 23 November 1989. In Castilla y León, besides the already-known El Oso lagoon (233), cranes were counted in locations that had recently been discovered in that winter, such as Zapardiel (560 cranes), Tudela de Duero in Valladolid, Villafáfila in Zamora and the Santa Teresa reservoir in Salamanca. This last resort is described as new because of the reservoir´s construction, but given it´s characteristics, it was possibly a traditional wintering area with roosts in large ponds or livestock drinking pools. 9 birds were counted in Madrid during the migration journey at El Pardo reservoir. In Castilla-La Mancha a good number of new locations were described (some traditional): Beleña in Guadalajara, where between 4,000 and 8,000 birds were counted during migration, and the Buendía reservoir, where they estimated some 1,000 cranes on migration. In Cuenca, the El Hito lagoon threw up 1,490 individuals. In Toledo, besides Rosarito (701) they

censused Buenaventura (142) and Navalcán reservoir (269) – which was opened in 1975 – and the census was done for the first time at 10 Manchegan lagoons (900), Tablas de Daimiel (200), Cabañeros (100) and Alcudia Valley (200), all traditional wintering locations which were not counted for the Grus project. In Extremadura, 37 locations were visited (26,361) and in Andalucía 6,965 cranes were counted at two locations in northern Córdoba, 1,000 were estimated in Doñana, 450 at Fuente de Piedra and 436 at La Janda, the Sevilla surroundings not being counted.

Population estimates were done in the following years: 80,000 (Sánchez *et al* 1993), 65,000 (Alonso & Alonso 1996) then in 2004 what can be considered the third national census was organized, with a result of 93,241 cranes (de la Cruz & Montoya 2008). In this, 53 locations were visited: 2 in Navarra (97), 4 in Aragón (15,416); 1 in Catalunya (1), 5 in Castilla y León (2,089), 10 in Castilla-La Mancha (12,755), 16 in Extremadura (56,980) and 10 in Andalucía (5,889). Without doubt, the number was already over 100,000 cranes then, as many of the known resorts were not visited. In the fourth national census, organized by SEO/BirdLife in 2007, all the crane locations were completely covered, obtaining the figure of 151,243 wintering cranes (Prieta & del Moral 2008), 250 participants visited 114 wetlands and counted 79,822 cranes in Extremadura (53% of the wintering population) in 70 areas; 27,504 in Castilla-La Mancha (18%) in 29 areas, 24,520 in Aragón (16%) in 7 areas; 2 in the Valencia Region at 2 wetlands, 3 on Menorca (Balearic Isles) and 3 in Catalunya.

As well as thesenational censuses, organizations such as ADENEX were organizing periodic counts in Extremadura, and the Alonso brothers were doing theirs at Gallocanta lagoon for their detailed migration monitoring. In Andalucía, this and other species were counted in various consecutive censuses under the Junta de Andalucía´s wildlife monitoring programme, without any national one being held again.

Five censuses were done in Extremadura in 2012, in which a maximum of 101,282 cranes were counted in December, although the population in this Community was already estimated to be over 100,000 birds (Román *et al* 2012*)*. After that, it was decided to organize a new national census in the winter of 2013 with two dates: one in the middle of December and the other at the end of January. In this first census 223,341 birds were counted in December and 168,011 in January, exceeding the figure of 200,000 cranes in Spain for the first time (Román *et al* 2014). Since then, two national and Iberian censuses have continued each year. In 2014/15 178,302 were counted in December and 197,304 in January (Román 2015), 203,669 and 173,872 in 2015/16 respectively (Román 2016), 242,225 and 260,549 in 2016/17 respectively (Román *et al* 2017), 221,451and 201,633 in 2017/18 (Román *et al* 2018); in the 2018/19 season: 255,303 in December and 248,131 on 1 February and then in 2019/2020 222,955 were censused in December and 226,354 in January (Graphic no.2).




Graphic no.2: Evolution of the Spanish population of cranes from 1979 to 2020 (reds bars: the January censuses for the seasons 2014 to 2020)

Winter habitat for cranes in Extremadura. Photo José A. Román.

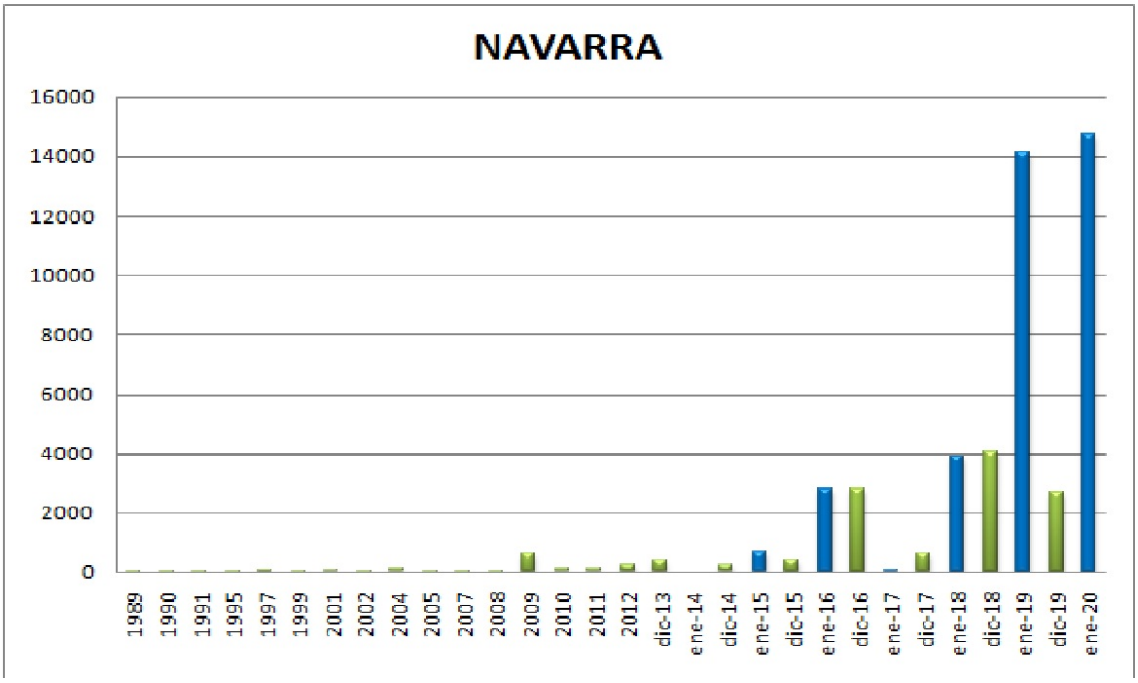
# DISTRIBUTION AND HISTORICAL EVOLUTION OF THE SPANISH POPULATION IN EACH AUTONOMOUS COMMUNITY

## NAVARRA

### Evolution and distribution of the population

Navarra has traditionally been a transit region for wintering cranes, the first 97 wintering cranes being recorded in a national census in 2004 (de la Cruz & Montoya 2008) in rice fields at Figarol (Fig. nº 1). This area is part of the Cinco Villas (Zaragoza) nucleus, with which they share feeding areas, using the Dos Reinos lagoon to roost and surrounding rice fields for feeding. The population fluctuates according to the availability of food resources and the intra-winter movements of the area. There are earlier records of cranes in Navarra (1989), none were recorded in the 2007 census (Prieta& del Moral 2008), but a few birds were recorded in this region in the following years. In the 2012/2013 census, the December count was negative and 383 were counted in January. The 2013/2014 census results were negative for both periods. In December 2014, 203 cranes were counted, with 658 in January 2015. In the first census of 2015/2016 406 birds were counted, with 5077 in January 2016. This figure coincided with an exodus from Germany that occurred a few days previously, caused by a sudden cold spell. 2,793 were counted in December 2016 and 81 in January 2017. The next census produced a figure of 613 birds in December and 3,858 in January. In 2018/2019, 4,034 were counted in December in three areas, and 14,129 in two areas on 1 February, 7 at Las Cañas reservoir, the rest at Figarol. In December 2019, 2,683 were counted, with 14,731 in January 2020. The results in recent years show that the population trend in Navarra continues to increase. Currently, the Navarra population is about 1.5% of the total. However, a regular wintering population is consolidating year on year in this Community. (Graphic no. 3).

The Navarra population shows a clear increase, favoured by the availability of food, the geographic proximity of populations in Aragón, and the good weather of recent years, which has favoured the presence of the species.




Graphic no.3: Evolution of the crane population in Navarra 1989/2019.January censuses in blue.


Figure no. 1: Crane wintering areas in Navarra

## ARAGÓN

### Evolution and distribution of the population

Aragón (Figure nº 2) is usually the second most important Community for wintering cranes in Spain, although it is replaced in some years by Castilla-La Mancha, depending on the feeding conditions and the water levels in its lagoons and reservoirs.
The growth of the Aragón population (Graphic no. 4) has been continual since 1979, when 409 cranes were censused (Fernández Cruz 1982) in the first "Grus" Project. 2,769 birds were counted in 1988 (Muñoz-Pulido *et al* 1990), 15,406 in 2004 (de la Cruz & Montoya 2008) and 24,350 in 2007 (Prieta & del Moral 2008). Initially, cranes began to winter at Gallocanta lagoon in small numbers in the 1970s, although they weren´t welcomed by local farmers, who were quite aggressive towards the species (Alonso *et al* 2018). As the lagoon became increasingly important during the migration journey, the number of wintering birds began to increase and at the same time as the Government of Aragón began to compensate farmers for damage to recently-sown crops. From 1980, the Alonso brothers and collaborators were censusing this lagoon at the end of each winter, and from 2005 a weekly census from the end of October to early March, organized for the Aragonese government (SODEMASA &SARGA). Nearby are the La Zaida lagoon and saline pools at Used, as well as some small lagoons in Guadalajara, which are within this basin and which the cranes usually use when they are full. After settling in this area, cranes colonized other nearby areas in the three provinces of Aragón, increasing the winter population significantly, becoming the second most important region for the species, along with Castilla-La Mancha. In the census of December 2013, 58,766 cranes were counted (the highest-ever figure to date) and 53,467 in January 2014; in the next season 26,110 were counted in December and 27,501 in January. In the census of December 2015, 35,676 were counted, and 27,407 in January 2016; in the December census of 2016,49,573 were counted, and 55,177 in January. The number fell dramatically in December 2017 to 19,615, with 15,650 in January, because of a major drought that deprived the species of many roost sites, especially in Gallocanta lagoon (which was without water all winter). After the water levels recovered, the species recovered too in the winter of 2018/2019, with 49,032 in December and 46,889 on 1 February, when 34 locations were visited, of which 11 of gave negative results. In December 2019, 40,070 were counted, with 31,461 in January from 20 locations with positive results and 10 with negatives.

Aragón hosts 19% of the Spanish population, where we can distinguish four sectors, some which include locations in Castilla-La Mancha and Navarra:

-Gallocanta Sector, which includes the lagoons of La Zaida in Zaragoza, Güialguerrero, Cañizar, La Hoya and Alba in Teruel and El Cuartizo and Llana in Guadalajara (Castilla-La Mancha).This sector is the most important in Aragón, as it may hold up to 70% of the cranes at times, although the water levels in the lagoons are very influential and there are years when this sector holds low numbers.

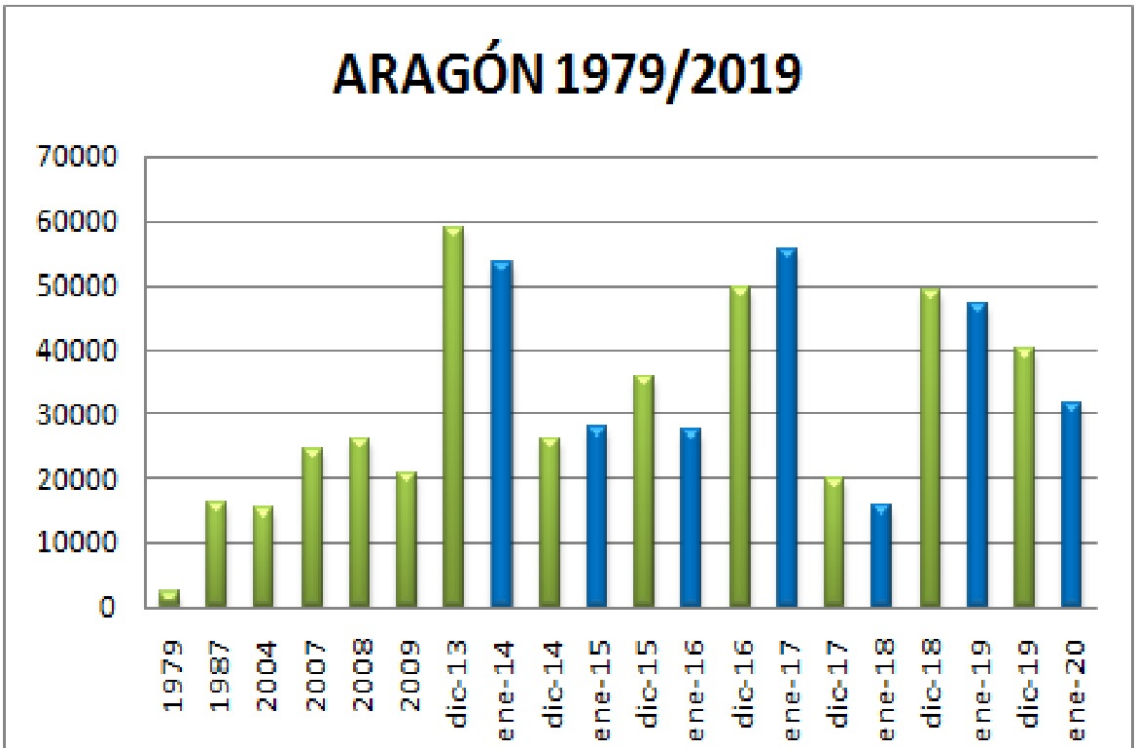
-Cinco Villas/Sotonera Sector, including Buena Vista Plain, Sopeña and the reservoirs La Loteta (Zaragoza) and Sotonera (Huesca) and the rice fields at Figarol (Navarra). It is the second in importance, but in the years when the cranes leave Gallocanta and come here, this can reach 70% too, especially in January.

-Bajo Ebro Sector withthenuclei of Valdecenicera, Saladas de Chiprana and Esquilao reservoir in Zaragoza, El Planerón and Saladas de Alcañíz in Teruel. A less-important sector, but which usually has a stable population.

-Cinca Medio Sector, with the rice fields of Selgua, Castleflorite and Alcolea de Cinca in Huesca. This sector has a highly variable number of cranes, depending on the food resources and water levels.

By province, Zaragoza holds the largest population of wintering cranes in the Gallocanta basin and the nucleus at Ejea de los Caballeros. The next in importance is Teruel, where the most important location is the shared part of Gallocanta lagoon and the Cañizar lagoon (when it has water). Finally, Huesca´s greatest number of birds are in the Castelflorite nucleus, the majority at Sotonera reservoir (which is also important during migration, before crossing the Pyrenees).

Gallocanta lagoon, depending on the season, can host up to 50% of the birds wintering in Aragón, although it fluctuates according to the water level, and when it was dry in 2017/18 there were only 40 individuals. The same happens at the nearby La Zaida lagoon, which is for communal use, regulated by the Used community and is usually without water, which has been used for cereal crops, apart from certain seasons, such as 2018/19.The Gallocanta lagoon and basin also function as a channel for the Iberian migration during both periods, with up to 95% of the population that winters in the peninsula and northern Africa passing through.




Graphic no.4: Evolution of the crane population in Aragón 1979/2019. January censuses in blue.


Figure no. 2: Crane wintering areas in Aragón

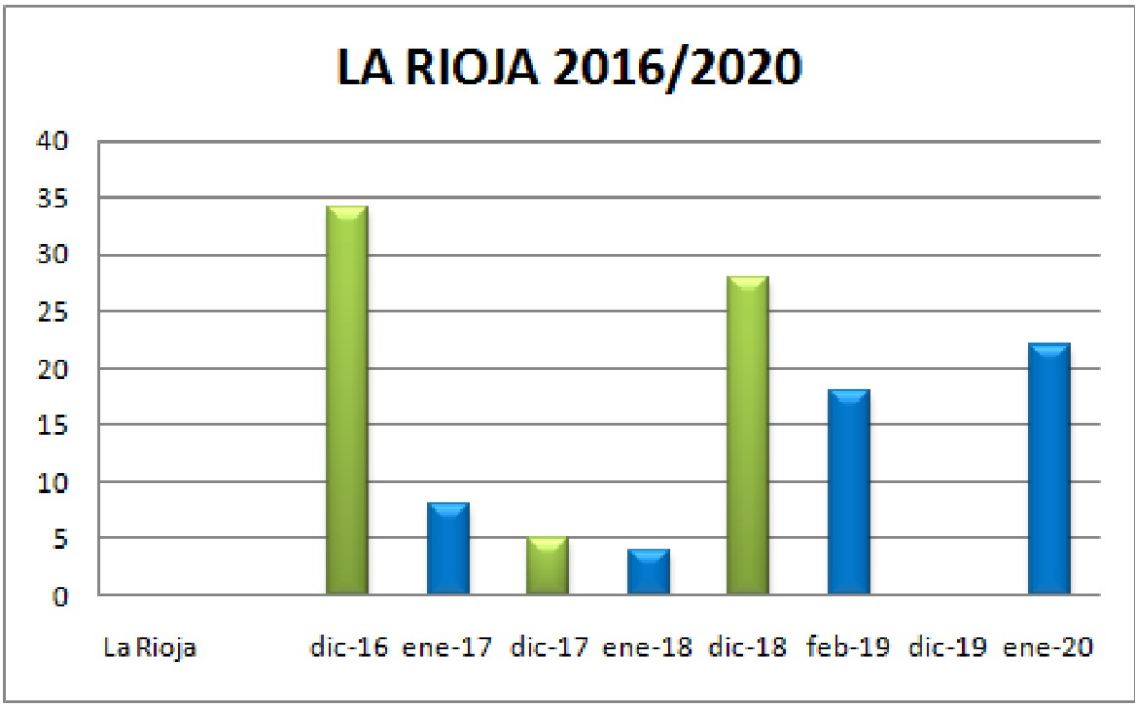
## LA RIOJA

### Evolution and distribution of the population

La Rioja (Figure no.3) is on the routes the cranes use on their migration journey through Tierra de Campos (Castilla y León) and those that head for the centre of the peninsula. Wintering birds have not been observed until recent years when in December 2016 (Román 2017) 34 birds were counted in two locations: Hervías lagoon and Sartaguda. Those at the second location were probably on migration.

Since then, only a small group has been found regularly at Hervías lagoon, and occasionally at Sotos de Alfaro since 2018: 8 in January 2016, 5 in December 2016, 4 in January 2017. In 2017, three were counted in December at Hervías lagoon (no birds in the second census), 25 in December 2018 and 18 on 1 February 2019 at Sotos de Alfaro. No birds were recorded in this Community in December 2019, and 22 were at Sotos de Alfaro in January 2020.

The small Hervías nucleus appears to have become established in these four winters and the future will show if the same happens at Sotos de Alfaro. The geographical condition is suitable for these small populations to continue and can grow demographically (Graphic no. 5).




Graphic no.5: Evolution of the crane population in La Rioja 2016/2019. January censuses in blue.

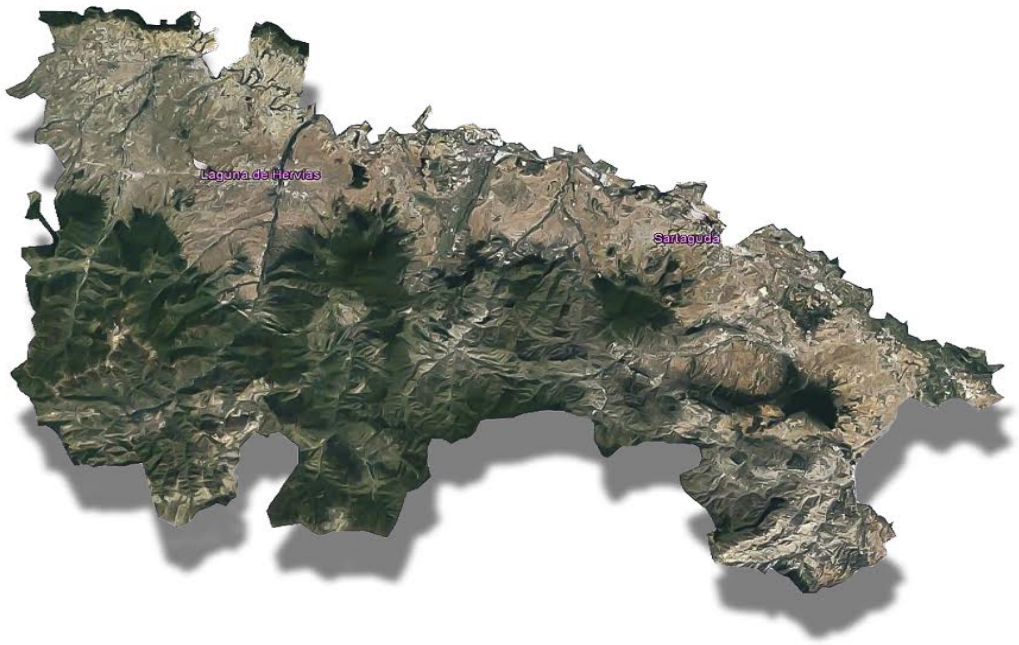



Figure no.3: Crane wintering locations in La Rioja

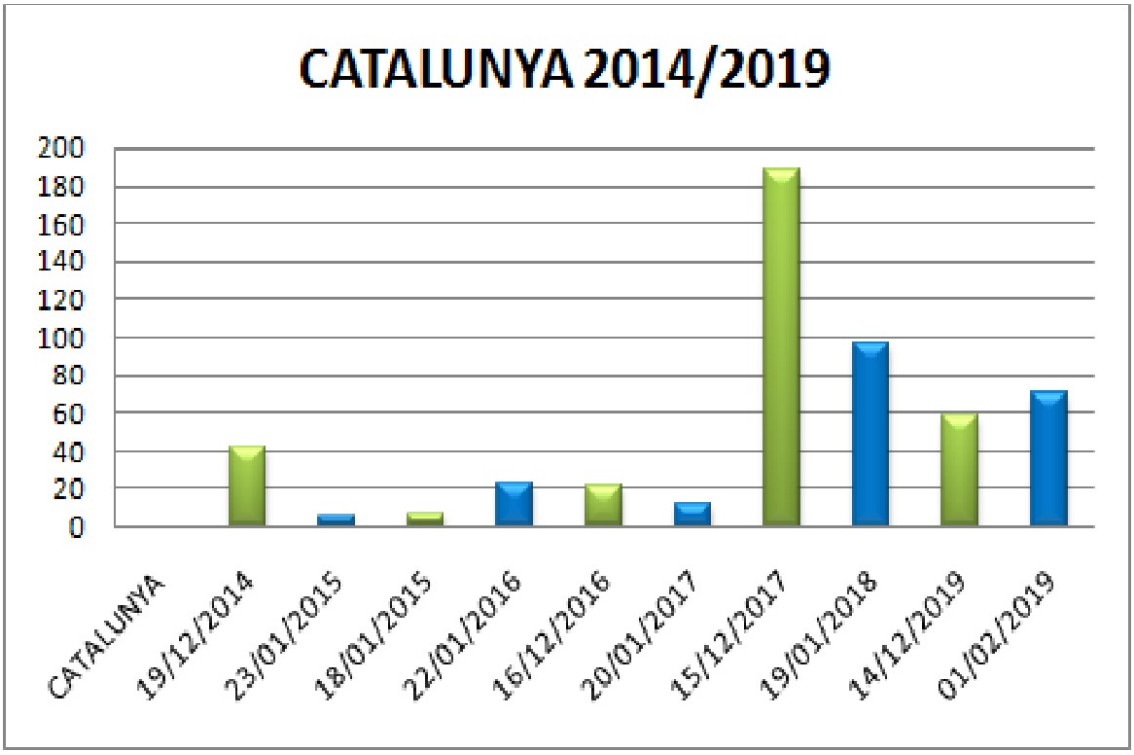
## CATALUNYA

### Evolution and distribution of the population

Cranes have not been regular in winter in this Community (Figure no. 4), although they were recorded on spring migrations when wind pushed them east (Fernández Cruz 1982). However, since the migration corridor to the south of the Alps has become established(an increasingly used route by birds arriving in Spain through Catalunya), the majority of birds winter at Los Aigüamolls de l'Empordá (Girona), a restored wetland thanks to the efforts of several conservation organisations, such as DEPANA. The presence of cranes has been verified in the Ebro Delta (Tarragona), although not regularly,

In the 2004 census (de la Cruz & Montoya 2008) 3 cranes were detected in Catalunya for the first time, but none in 2007 (Prieta& del Moral 2008). In the first census of the current series none were found either, although we cannot rule out the possibility that some could have wintered. In December 2014 42 birds were counted, with 5 in January, and in the next season 6 were censused in December and 23 in January. In December 2016, 21 birds were counted, with 12 in January. The highest count to date was achieved in December 2017 with 188 birds, and 97 in January 2018. In 2018/79, 58 were counted in December, with 71 on 1 February in four locations. In 2019/20, 19 were censused in December, with 24 in January.

The trend is therefore clearly positive, although with ups and downs (Graphic no. 6).




Graphic no.6: Evolution of the crane population inCatalunya, 2014/2019. January censuses in blue.


Figure no.4: Crane wintering locations inCatalunya

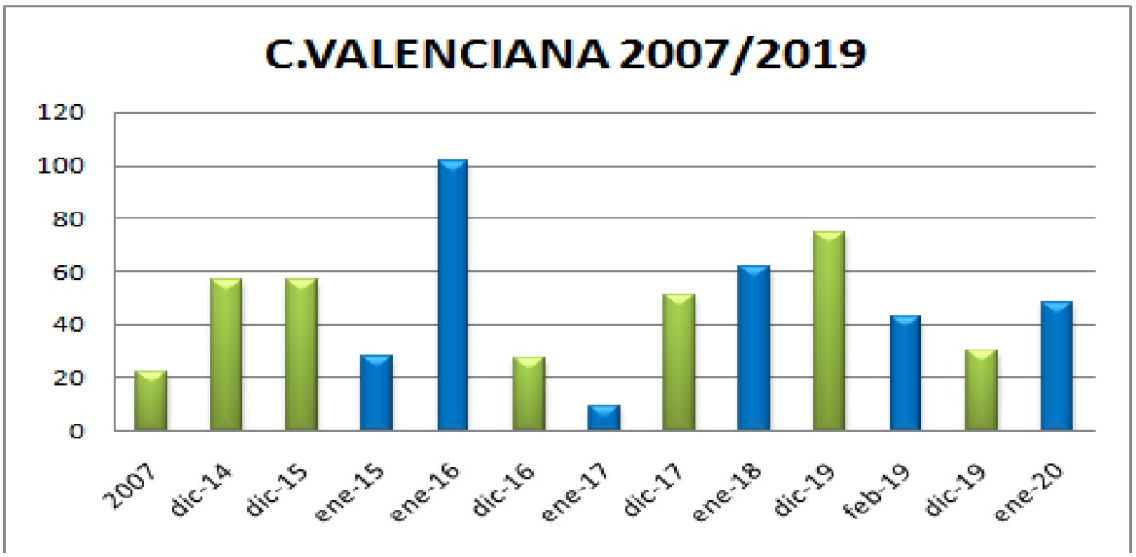
## VALENCIAN COMMUNITY

### Evolution and distribution of the population

The Valencian wintering population is small, and is regularly present only at El Hondo reservoir, while other wetlands are occupied temporarily in the majority of cases. Besides the wintering birds, this Community is on the Mediterranean corridor route for cranes going to winter in northern Africa, so some of the birds found during censuses could actually be migrating birds, although we have included them when they are found on census days. These cranes usually have breaks in wetlands where remnants of marshes have remained, and in rice fields.

Cranes were first recorded in this Community in the 2004 census (de la Cruz & Montoya 2008), with a single bird, and 22 in 2007 (Prieta & del Moral 2008) in two locations: Xilxes (Castellò) with 3 birds and 19 at El Hondo reservoir Alacant). No information came from this Community in 2013, but in 2014 they recorded 57 birds in December and January. In December 2015, 28 individuals were censused, with 101 birds in January (all-time maximum for this Community). In the next season, 27 cranes were counted in December and 9 in January. 51 were censused in December 2017 with 62 in January 2018. In 2018/19, 75 birds were counted in December and 42 on 1

February, then 30 in December 2019 and 48 in January 2020 (Graphic no. 7). Only El Hondo reservoir is a regular winter resort in this Community (Figure no. 5).




Graphic no.7: Evolution of the crane population in the Valencian Community 2007/2019. January censuses in blue.


Figure no.5: Wintering crane locations in the Valencian Community

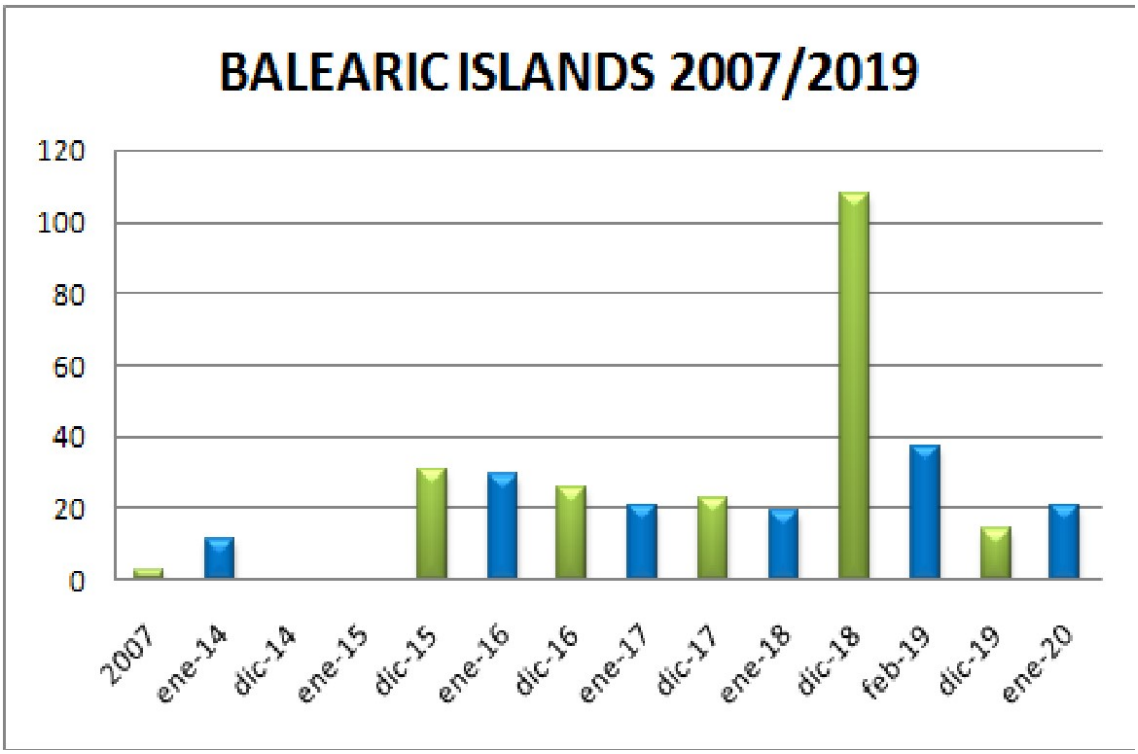
## BALEARIC ISLES

### Evolution and distribution of the population

The isles host a small population of wintering cranes, associated with saline lagoons and coastal áreas, usually on Mallorca, although they can be seen on Ibiza and Menorca. Some are migrating birds that are using the Mediterranean corridor to winter in northern Africa, and some cranes may even use the islands as a reference point when crossing the Mediterranean directly from Italy or France without using the Spanish east coast.

They were first recorded on the 2007 census (Prieta & del Moral 2008), with 3 birds. There was no information for December 2013, but 11 individuals were counted in January 2014, 31 cranes in December 2014 and no data for January 2015. 31 were counted in December 2015, with 29 in January 2016, In the 2016/17 season, 26 were censused in December and 21 in January, then in December 2017 23 were counted, with 19 in January 2018. In the 2018/19 winter, 108 birds were counted in December (the record for this autonomous community) with 37 on 1 February. In December 2019, 14 were censused, with 21 in January 2020 (Figure no. 6).

We estimate the regular wintering population to be under 40 birds, which may be increased by the presence of migrants (Graphic no. 8)




Graphic no.8: Evolution of the crane population intheBalearic Isles 2007/2019. January censuses in blue.

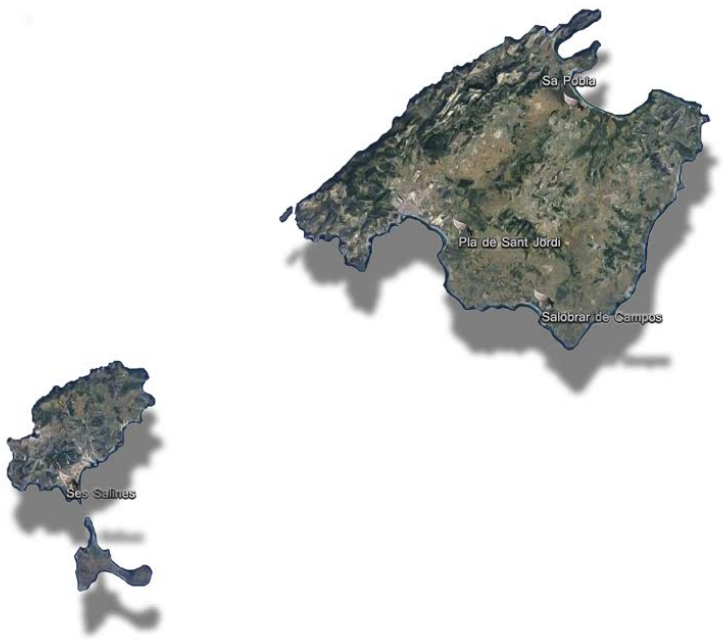



Figure no.6: Wintering crane locations in the Balearic Isles.

## ASTURIAS

### Evolution and size of the population

The presence of cranes in this community is rare, with none wintering here. In the December 2018 census a single crane was found, a second-year Swedish bird called "Sophie" and carrying a GPS/GSM device, in the Villaviciosa estuary. In December 2019 another single crane was found, with none in January 2020. The presence of birds indicates lost individuals.

## GALICIA

### Evolution and size of the population

There are few records of any birds in Galicia during migration periods. In 2018/19 a family group of 4 birds wintered for the first time, being at Fervenza reservoir (Coruña) on both census dates, and a solitary bird was seen in Lugo though not on census dates. In 2019/20, wintering was repeated at the same reservoir, with 3 birds in December and 4 in January. Censuses will have to continue to see if this winter trend is confirmed.

## CASTILLA Y LEÓN

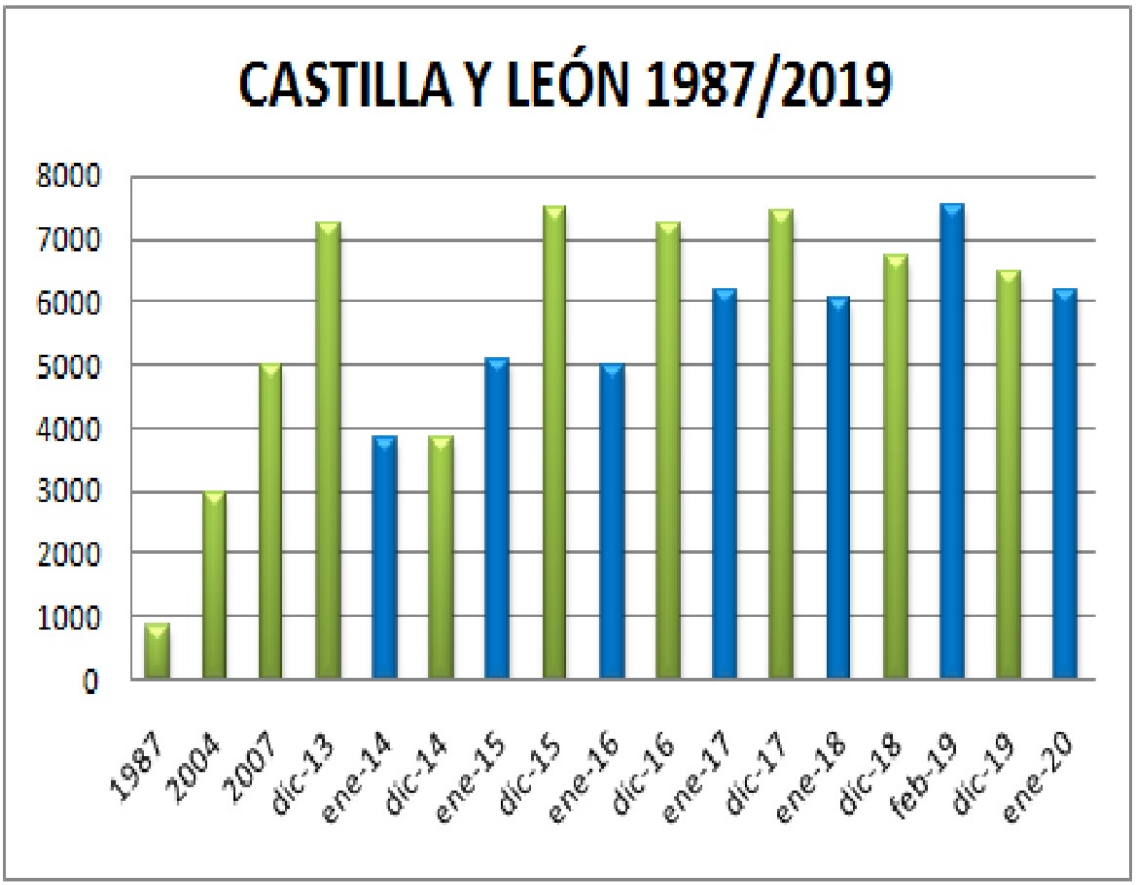
### Evolution and distribution of the population

Until the middle of the 20th Century, cranes migrated and accessed the dehesas of south-western Iberia along a route through Tierra de Campos (Valverde 1952), but the desiccation of its lagoons led to a general abandonment of it and the search for alternative routes through the centre of Spain, when they began to use Gallocanta lagoon.

The community of Castilla y León is the fifth in importance for cranes in Spain, with 3% of the total. The wintering population is distributed through the provinces of Salamanca, Ávila, Zamora, Palencia, Valladolid and occasionally Soria. They are not present in Burgos, Segovia (only on migration) or León.

Although the Castilla y León has been increasing since the first censuses, it is currently fairly stable at around 7,000 birds. The first results produced 280 cranes in 1979 Fernández Cruz 1982) in just one location (El Oso); 669 in 1988 (Muñoz-Pulido *et al* 1990) in 5 locations, 2,089 in 2004 (de la Cruz & Montoya 2008) in 7 locations and 4,996 in (Prieta & del Moral 2008) in 14 locations. The following results have been obtained in the current census series: 7,215 in December 2013 and 3,815 in January 2014; 3,841 in December 2014 and 5,075 in January 2015; 7,489 were censused in December 2015 and 4,971 in January 2016. In the next season (2016/17) 7,258 and 6,615 were counted respectively. 7,406 were censused in December 2017, with 6,022 in January 2018. In 2018/19 there were 7,406 in December and 7,511 on 1 February. 6,465 were censused in December 2019, and 6,158 in January 2020 (Graphic no. 9).

Between 50 and 70% of the cranes are found in Salamanca, more than half of them at the Riolobos weir in the north-east of the province, associated with maize crops and connecting with the nuclei of Valladolid and Ávila. The other significant nucleus is located in the dehesas of the south, where they use the Santa Teresa reservoir to roost. Other small nuclei are located in the dehesas of Teltes, in the west of the province. Ávila is the next province in importance, with the El Oso area (a geographic reference point during both migrations). Wintering also occurs in the south of this province, with cranes belonging to the nucleus at Rosarito (Castilla-La Mancha). After that are the wetlands at Villafáfila in Zamora, with a major crane presence at the start of winter but lower in January. They regularly winter in Valladolid (although they may be absent in dry years) at the lagoons of Mullidares, La Colada and La Zarza. This population is in sharp decline due to agricultural changes and could disappear in the future. The recovery of La Nava lagoon in Palencia has led to cranes wintering there again, as at Boada (Figure no. 7).




Graphic no.9: Evolution of the population in Castilla y León since 1987. January censuses in blue.


Figure no.7: Crane wintering locations in Castilla y León.

## MADRID COMMUNITY

### Distribution and size of the population

There is not usually a wintering population in Madrid Community, although some birds, basically migrants, are found around the El Pardo reservoir. This is a highly important community during both migration journeys.

In the census series that were have been organizing, these have been the results: none in December 2015 and 6 in January 2016; none in December 2016 and 5 were counted in January 2017; December 2017 was also negative and 37 were counted in January 2018. In the 2018/19 census, 45 birds were counted in December (the highest ever) and 26 in January; none were counted in December 2019 and there were 16 in January 2020.

## CASTILLA-LA MANCHA

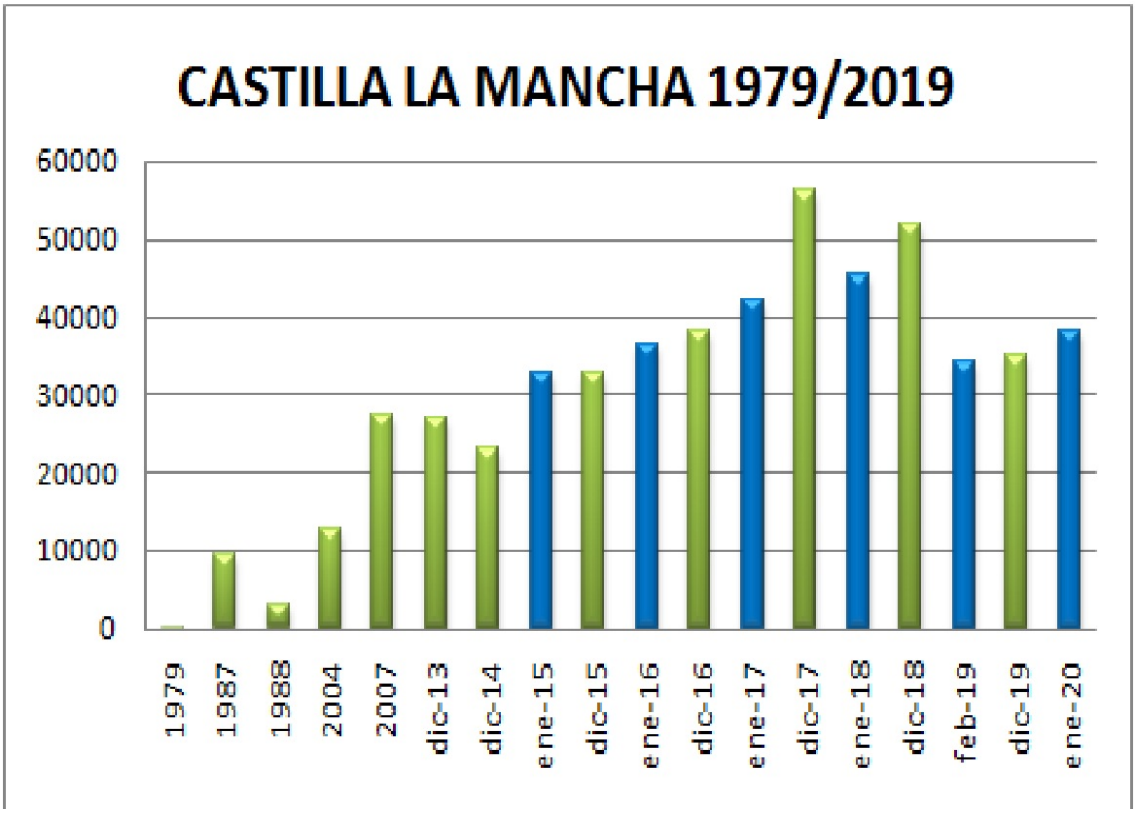
### Evolution and distribution of the population

The Castilla-La Mancha population has had a continuous positive growth, occasionally exceeding 50,000 individuals, making it the second-most important autonomous community for Spanish cranes, only beaten by Aragón in some years. It all depends on each winter season: weather, aquifer levers and food availability. Extremadura shares some of the crane nuclei in Toledo and Ciudad Real provinces, some from the latter also going into Córdoba province.

This community has never been easy to census since the first counts, owing to the great number of nuclei to visit, in addition to the remoteness of some peripheral ones (such as Alcudia), which has made monitoring difficult, so that on more than one occasion the figures have not shown the true situation of the winter.

In the first census of 1979, 187 birds were recorded (Fernández Cruz 1982), without having visited any lagoons in La Mancha, Cabañeros, Alcudia or Tablas de Daimiel. In 1988, 2,836 cranes were counted at 10 locations (Muñoz-Pulido *et al* 1990); 16,055 in 2004, again at 10 locations (de la Cruz & Montoya 2008). In 2007, 25,504 were counted in 19 locations (Prieta & del Moral 2008). In the census series begun in 2012 (Román *et al* 2013/2018) 26,905 cranes were counted in December 2013 (no census in January 2014); 22,951 in December 2014, with 18,954 in January 2015; 32,857 in December of that year and 36,527 in January 2016; 38,239 in December 2016 and 42,141 in January 2017; 56,202 in December 2017 (the all-time record for this community) and 45,687 in January 2018. The significant increase observed in that census was linked to the decrease in Aragón, which registered an historic minimum due to the lack of water in its lagoons (Graphic no. 10). In December 2018, 51,770 were counted, with 34,121 on 1 February. In December 2019, 34,978 were counted, with 38,294 in January 2020. In general, 20% of Spanishcranes winter in this community.

The provinces with most cranes are Ciudad Real and Toledo, in very similar proportions, followed in importance by Cuenca. The figures for Albacete are more modest. Wintering is regular in all the provinces apart from Guadalajara, where they are seen on migration, although some birds may be present at lagoons in the north of the province when they have water, coming from the Gallocanta nucleus (Figure no.8).




Graphic no.10: Evolution of the crane population in Castilla-La Mancha 1979/2019. January censuses in blue.

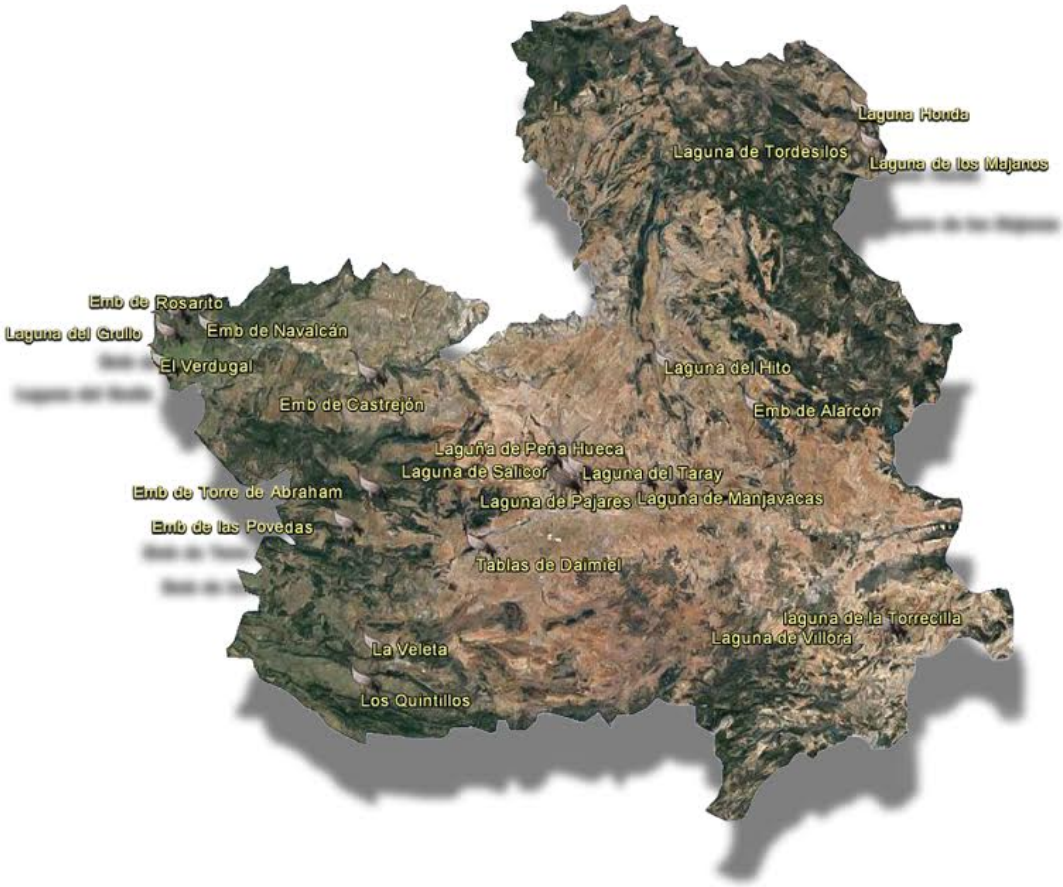



Figure no.8: Crane wintering locations in Castilla-La Mancha.

## EXTREMADURA

### Evolution and distribution of the population

Extremadura continues to be the principal wintering area for Iberian cranes, being home to between 51% and 54% of Spanish cranes. The first studies of these birds made in this region (Pérez Chiscano & Fernández Cruz 1971) already showed the importance of Extremadura within Iberia, when they were then very dependent on the dehesas and rain-fed cereal crops. The climatic conditions and dehesas, as well good roost sites, were the key to wintering until the middle of the 20$^{th}$ Century, when a drastic agricultural transformation took place, in which they lost thousands of hectares of rain-fed crops and dehesasto irrigated land, and therefore a radical change of land use. This change, with ever-increasing areas dedicated to maize and rice, was beneficial to cranes over time, which as good opportunists knew how to take advantage of the stubble fields, re-arranging their distribution in the region. The most intensively transformed zones were the Vegas Bajas and Vegas Altas (lower and upper plains) of the River Guadiana. In the Central Zone in the east of the region, spanning

both provinces, as the area of tomatoes, maize and rice increased, so did the number of cranes, which quickly found easy and abundant feeding there, without neglecting the dehesas. The dehesas continue to be important, especially in the second half of the winter, when consuming acorns allows cranes to take in great quantities of calories, which are very important to them for making a rapid pre-breeding migration. The December censuses generally produce higher figures in irrigation areas, lowering in January when more are foraging in the dehesas. However, in the 2018/19 winter, which began with abundant rain, the harvest was late, which delayed ground work, leaving abundant food available to the cranes during the entire season in these areas, allowing them to spread across the entire zone to look for food.

Cranes in Extremadura are distributed throughout the region, and all nuclei are interconnected, as well as the peripheral ones being shared with other provinces, such as Ciudad Real, Córdoba and Toledo, as well as Portugal. This means that 65% of the Iberian cranes are found in the south-west of the Peninsula, with approximately 160,000 birds, Extremadura being at the centre of this great nucleus (Figure no. 10).

Extremadura´s population of cranes has been well known since the 1970s (Fernández Cruz & Pérez Chiscano 1971), when the region´s importance for the specieshad already been demonstrated. The first censuses which ADENEX organized were centred on the most important areas (without forgetting the others) and on studying the species within them. The first complete censuses were done by the Junta de Extremadura and University of Extremadura, which estimated some 42,200 wintering birds (Sánchez *et al* 1993). Next, ADENEX took charge of coordinating them, and censused 47,491 in 1995/96 Fernández *et al* 1996), 40,000 in 1999 (Ferrero & Valiente) 58,150 in 2002 (ADENEX 2003), 57,000 in 2004 (de la Cruz & Montoya 2008), 79,833 in 2007 (Prieta& del Moral 2008). In the series begun in 2012 (Román *et al*), 101,282 were counted in December, with 88,244 in January 2013; 121,341 in December 2013 and 99,451 in January 2014; 120,161 in December 2014 and 132,902 in January 2015; in December 2015 114,198 were censused, with 89,733 in January 2016; 132,174 were counted in December 2016 and 127,513 in January 2017; In December 2017 there were 116,975, and 116,171 were counted in January 2018. The crane population remained stable during the whole of the winter 2018/19, with 133,865 (the record so far) censused in December and 130,203 in the census on 1 February.In December 2019, 125,558 were counted, with 121,733 in January 2020.

The evolution of the population is growing, similar to the total in Spain, having increased by more than 50,000 individuals compared to the 2007 census. The number had already exceeded 100,000 birds in the first census of 2012, and although there have been more modest numbers in subsequent censuses, we nevertheless estimate that the population of Extremadura regularly exceeds this figure, being between 120,000 and 130,000 (Graphic no.11).

The Central Zone has been the channel for all these wintering birds (and for migration) due to the great availability of food resources, which has led to a significant change in the number of cranes in the adjacent areas, as the demographic growth observed in this area has modified the distribution and staying time of these birds. However, in

especially dry years when the stubble fields are worked earlier, the cranes occupy the adjacent dehesas in significant numbers, demonstrating that the dehesa continues to be a vitally important resource for the species.

For the censuses, we break down the information according to the sectoral model proposed by Sánchez *et al* (1993), although we have renamed some of the sectors:

-1: Alagón Sector: in the north-west of Cáceres, with two main nuclei constituted of the Gabriel y Galán and Borbollón reservoirs, with some smaller locations. The cranes feed mostly in dehesas near to each reservoir, although they also feed in maize and rice stubble south of Borbollón (Huélaga). 70% of the cranes counted in the sector are in the area around this reservoir.

-2: Campo Arañuelo (Navalmoral de la Mata) Sector: in the north-east of Cáceres province, between the Tiétar and Tajo rivers, it consists of three principal nuclei: Valdecañas reservoir, Palancoso lagoon and Tiétar Monfragüe, to the north of the national park. In all of them, the majority of cranes use dehesas and rain-fed cereal crops, although they also take advantage of maize stubbles around Rosarito and Monfragüe. Besides these reservoirs, there are some areas with roosts in lagoons or ponds in dehesas. Within this sector, feeding areas and some roosts are shared with Rosarito and dehesas in Toledo province. The construction of photovoltaic mega-projects could affect the distribution and number of wintering birds in the future.

-3: Llanos de Brozas and Alcántara Sector: in the south-west of Cáceres province, this is a nucleus with several roosts, whose cranes spread through dehesas and grasslands between Brozas, Membrío and Salorino, which presents some difficulty as each year there may be changes to the roost sites, making them hard to find. The population trend is decreasing.

-4: Ayuela (Aldea del Cano)Sector: in the south of Cáceres province, located in dehesas, grasslands, sown fields and cereal stubbles surrounding Aldea del Cano and Casas de Don Antonio, crossed by the River Ayuela and is small tributaries.

-5: Almonte/Tozo Sector: located in the centre of Cáceres province, north of Trujillo in two main nuclei, Talaván/Monroy and Trujillo/Torrecillas de la Tiesa. The cranes use dehesa and traditional cereals, with a decreasing trend, although numbers pick up in particularly dry years. The flock at Talaván reservoir causes concern, as there are fewer birds each year because of disturbances at this small wetland, mainly by anglers, as well as photovoltaic macro projects which are significantly reducing the feeding habitat and day-time roosts.

-6: LasTiendas/Morantes (North Badajoz) Sector: situated in the Vegas Bajas del Guadiana with irrigated crops (maize and rice), dehesas and dry grasslands between Mérida, Badajoz and the south of Cáceres province, with three nuclei. The most important location is Los Canchales reservoir which has been increasing ever since its construction by concentrating the cranes from neighbouring dehesas at roosts here. The other nucleus consists of the dehesas around Roca de la Sierra, using Morantes

reservoir as the main roost site, although there another small one between Villar del Rey and Puebla de Obando, which was counted for the first time in this census, although its existence was previously known. These cranes roost in farm ponds and at Peña delÁguila reservoir. Finally, a third nucleus near the border with Campomaior (Zangallón),has feeding areas in Portugal.

-7: Guadiana/Cuncos(South Badajoz) Sector: situated in the south-west of Badajoz province, composed of five nuclei: in the north, the lagoons of Albuera, Las Merinillas and a new one to the west, on the border with the River Guadiana (Villareal). In the centre, a new one has appeared following the creation of Villalba de los Barros reservoir, hosting a small but steadily growing population. In the south is the nucleus in the Cuncos dehesas, which has experienced a significant change as a result of the creation of Alqueva reservoir in Portugal, and the consequent agricultural change (super-intensive), modifying the routines and with new roost sites appearing on some of the reservoir shores. All of these cranes move between the two countries.

-8: Matachel/Matanegra (Alange) Sector: in the centre of Badajoz province, with four nuclei: Alange, El Moral and Los Molinos reservoirs, and the Matanegra area. This is a very agricultural area, with many olive and vine groves, increasingly with super-intensive planting, which is seriously threatening the species, and already some localities, such as Hinojosa and Usagre, run the risk of disappearing as wintering areas.

-9: Central Zone Sector: hosting the bulk of Extremadura´s wintering population, with up to 65% of the total, this is the most important wintering area in Spain. It is situated in both provinces, in the Vegas Altas del Guadiana, with more than 100,000 hectares under irrigation and with dehesas in sharp decline, with an increasing presence of super-intensive crops, primarily of olives and fruit trees. Because of the significant number of birds present and the high number of roost sites, this sector is censused by feeding areas, which requires significantly fewer participants, greatly facilitating the census. To this end, we have divided the sector into 11 sub-sectors: Logrosán Sector is in Cáceres, located between the town and the provincial border, with birds in dehesa and irrigated crops; straddling the two provinces is Madrigalejo/Obando Sector (between the two towns), almost all occupied by irrigation with a little bit of holm oak; Valdehornillos/Búrdalo Sector is located between Santa Amalia and Miajadas; Villar de Rena/Alcollarín Sector between Campo Lugar and Villar de Rena is under irrigation, and Palazuelo/La Mata Sector between Valdivia and Palazuelo, also irrigated crops.

In the province of Badajoz area are: Acedera/Puercas Sector between Acedera and Valdivia, with cranes in irrigated land and dehesas (continuing to be converted); Las Rañas/El Alandre Sector between Casas de Don Pedro and Pueble de Alcocer, primarily in dehesas and pasture, but also some irrigated land; Moheda/Vegas Altas Sector between Navalvillar de Pela and Vegas Altas village, where there is still a good area of dehesa but most is irrigated crops, which are expanding; Los Guadalperales Sector betwwen this village and the Orellana Canal; Yelbes/Medellín Sector between Medellín and the River Búrdalo, where all the area has been transformed; and Guadámez/Búrdalo Sector between both rivers as far as Cornalvo, also extensively transformed (Figure no. 9).


Figure no.9: Sectors of the Central Zone of Extremadura.

-10: Guadalemar/Guadalupejo Sector, situated between Valdecaballeros, Siruela, Puebla de Alcocer and the head of La Serena Reservoir. This sector was previously included in the Central Zone, but we have separated it on account of its geographic characteristics and distance. It is a traditional area and all the cranes are found in dehesas, pasture and rain-fed cereals.

-11: La Serena Sector, which is located in this district in Eastern Badajoz, with dehesas, wide grasslands and cereal crops. One of the most traditional and best known and studied sectors (Fernández Cruz & Pérez Chiscano 1971, Calderón 2000). It has up to 8 nuclei, almost all associated with holm oak dehesas, the most important being in the dehesas of Badija (Castuera) and Monterrubio de la Serena, with some roost sitesshared with cranes from Córdoba and La Mancha. Its situation and characteristics mean it is one of the last areas to be occupied.

-12: Campiña Sur Sector (Azuaga) in the south-east of Badajoz, with two principal nuclei, one in Arroyo Conejos and San Pedro dehesa to the west, and the other between Azuaga, Granja de Torrehermosa and Peraleda del Zaucejo to the east. It is made up of dehesas and rain-fed cereals. Some cranes may go to roost in Córdoba province, or vice-versa.

In recent years we have been witnessing a feverish race to change crops, replacing maize and rice, fundamentally, for new super-intensive crops, with thousands of hectares of olive and fruit trees. In addition, some of the mis-managed dehesas of this area are being planted illegally with these new crops. This is an unstoppable act, and if it continues at this rate it could mortgage the future of the species, and it is possible that cranes could disappear from wide areas of the Central Zone when there could be insufficient food resources.

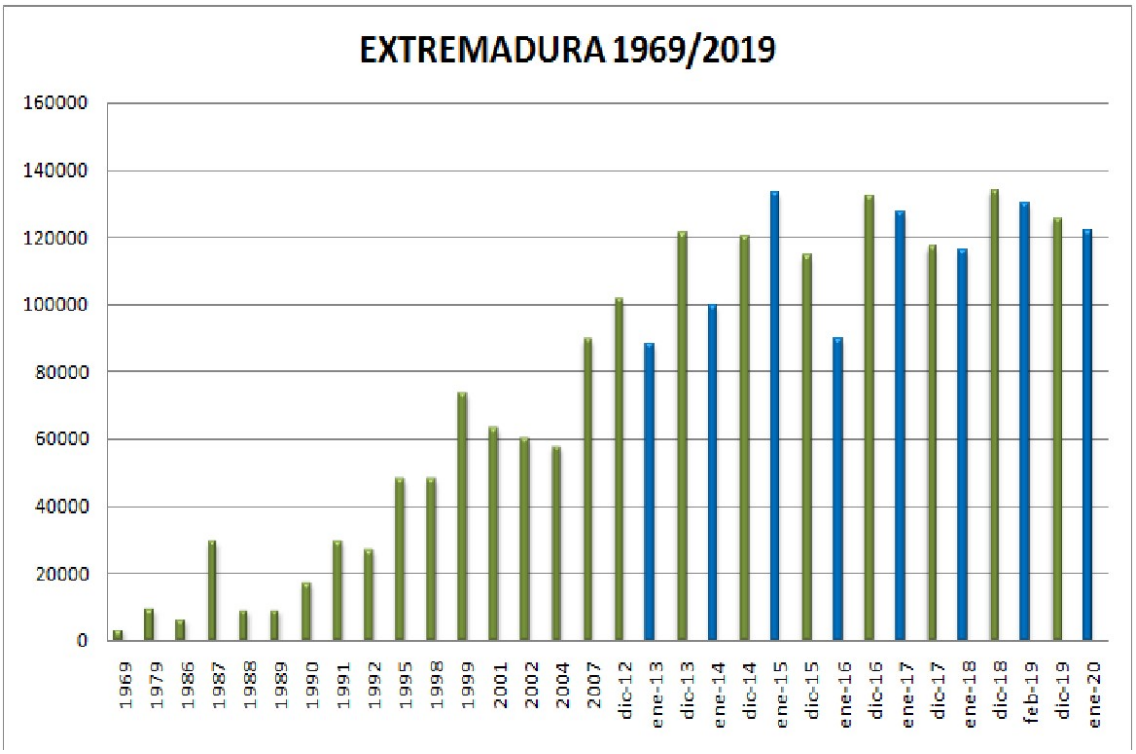
Regarding the sectors in Cáceres, there is growth in the Alagón and Campo Arañuelo sectors, with stability in Almonte/Tozo and Ayuela, although their populations fluctuate and move around each winter according to the availability of food and roost sites. The Llanos de Brozas and Alcántara sector shows a decreasing trend without there having been a significant hábitat change, the dispersal of cranes and availability of roost sites does not make counting them easy, and this is not always completed properly.

Of the Badajoz populations, there is concern especially over the situation in the Matachel/Matanegra sector, where the Hinojosa del Valle nucleus is in steep decline due to the serious transformation that is happening with super-intensive crops (fruit trees and vines) as well as the construction of a major photovoltaic site (where two already have been built), which could very negatively affect the species, so that this nucleus could certainly disappear in the future.

In the Guadiana/Cuncos sector, the Cuncos nucleus is also affected by super-intensive fruit tree plantations, which is affecting the cranes´ distribution, their range already dimisnished by the creation of the Alqueva reservoir. Another nucleus, at the Albuera lagoons, has been dry for a few years due to the decrease of the aquifer, caused by the continued drilling of wells for watering new crops of olives and trellised vineyards (which affects the cranes and other steppe species). Un this situation, the cranes are currently roosting at Valdelagrana reservoirs and others have moved to the Villalba de los Barros reservoir.

The La Serena and Campiña Sur sectors are showing a decreasing trend, although it depends on the situation in the Central Zone each winter, so the numbers may vary from year to year.

The Las Tiendas/Morantes sector shows an upward trend, especially the Los Canchales reservoir which is becoming more important each year as a rest area, due to its strategic position. Another increasing sector is the Guadalupejo/Guadalemar sector, basically around the latter river as the cranes use the shores of the La Serena reservoir to roost.




Graphic no.11: Evolution of the wintering population of cranes in Extremadura from 1968 to 2019. January censuses in blue.

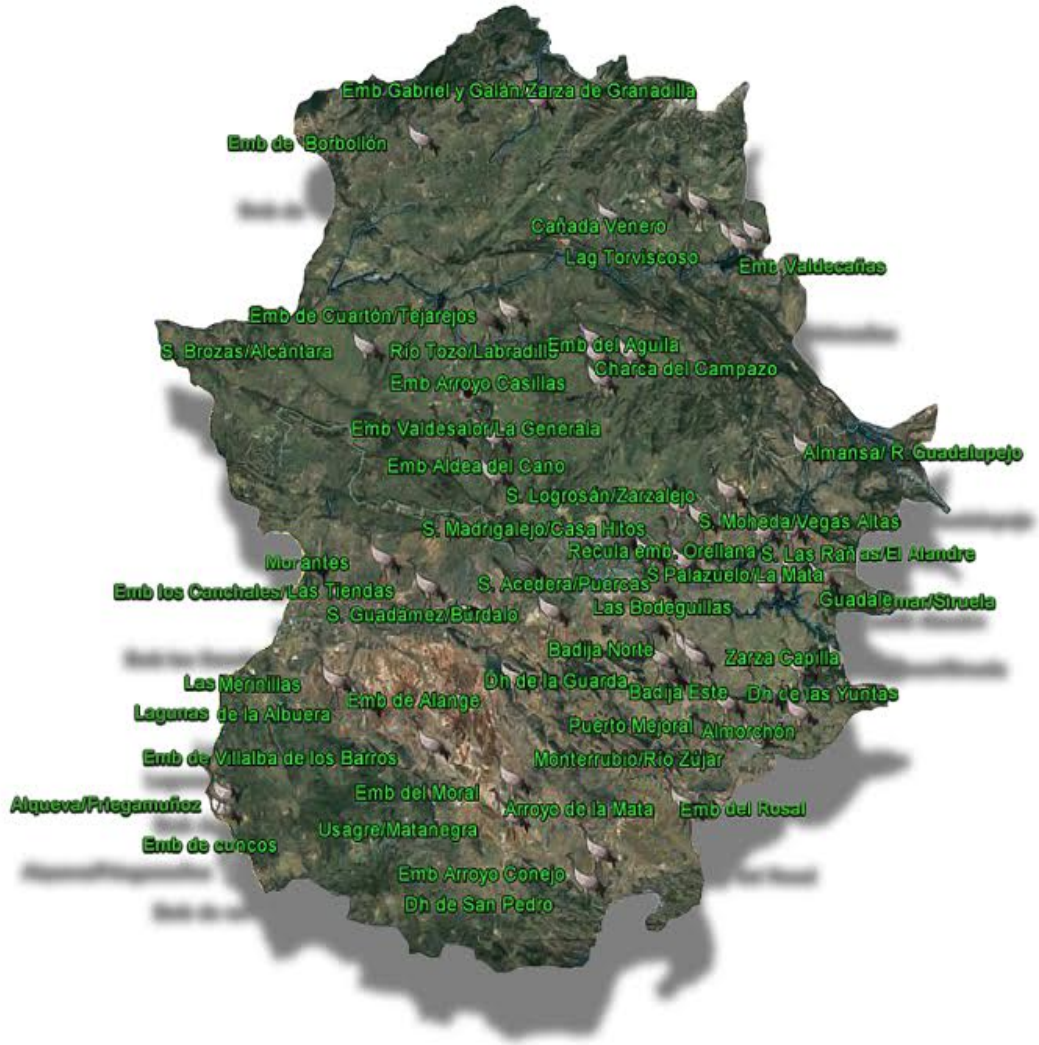



Figure no.10: Crane wintering locations in Extremadura.

## ANDALUCIA

### Evolution and distribution of the population

As already indicated, Andalucía was the last (and only known) enclave for breeding cranes in Spain (Bernis 1966), and since then this region only hosts wintering cranes, distributed across northern Córdoba, La Janda (Cádiz), Doñana (Sevilla and Huelva), Fuente de Piedra (Málaga) and the dehesas of the Sevilla´s countryside, where they are not easy to census properly as many farms are private and access is not easy. There is also a small nucleus at Baza, in Granada province.

From the first censuses the Andalucian population was shown to be growing, reaching a certain level of stability of around 16,000 individuals, although in some years these figures were significantly higher or lower, principally in northern Córdoba. The Andalucian wintering locations are traditional, with the exception of Doñana, which

the cranes didn´t begin to use until the second half of the 20th Century, mainly due to agricultural changes in the surrounding area, previously being rare within the national park (Valverde 1960). (Figure no. 11).

851 cranes were censused in 1979 (Fernández-Cruz 1982); 6,944 in 1988 (Muñoz-Pulido*et al* 1990); 5,892 in 2004, without Doñana National Park (de la Cruz & Montoya 2008); 14,715 in 2007 (Prieta & del Moral 2008). During the years 2006/2011, several consecutive censuses were done under the Andalucía Government´s Wildlife Monitoring Programme, obtaining the following results: 16,129 cranes were counted in 2006/07 (2,100 in Cádiz, 10,275 in Córdoba, 220 in Huelva, 1,384 in Málaga and 2,340 in Sevilla); 10,500 in 2007/2008: (1,538 in Cádiz, 5,509 in Córdoba, 7 in Granada, 246 in Huelva, 1,400 en Málaga and 1,771 in Sevilla, figures that do not agree with the national census. Probably because they were done on different dates, or not all locations were counted); 13,107 were censused in 2008/09 (1,357 in Cádiz, 6,737 in Córdoba, 255 in Huelva, 1,328 in Málaga, 2 in Granada and 3,430 in Sevilla); 10,150 were counted in 2009/10 (1,927 in Cádiz, 4,620 in Córdoba, 273 in Huelva, 1,459 in Málaga and 1,871 in Sevilla); only 6,813 were counted in 2010/11 (1,440 in Cádiz, 2,688 in Córdoba, 210 in Huelva, 1,278 in Málaga and 1,197 in Sevilla).

In the series that we initiated in 2013 (Román *et al* 2013/2019) the following results have been obtained: 9,078 in December 2013 and 2,284 in January 2014 (when not all locations were covered); 4.417 were counted in December 2014 with 11,917 in January; 12,978 in December 2015 with 11,139 in January 2016; 11,996 were counted in December 2016 and 23,660 in January 2017 (the record count to date); 19,865 in December 2017 and 15,493 in January 2018;9,727 in December 2018 and 14,601 en January 2019. 13,107 were counted in December 2019 with 13,837 in January 2020. Andalucía hosts up to 6% of the wintering population, and is the fourth region in importance for this species.

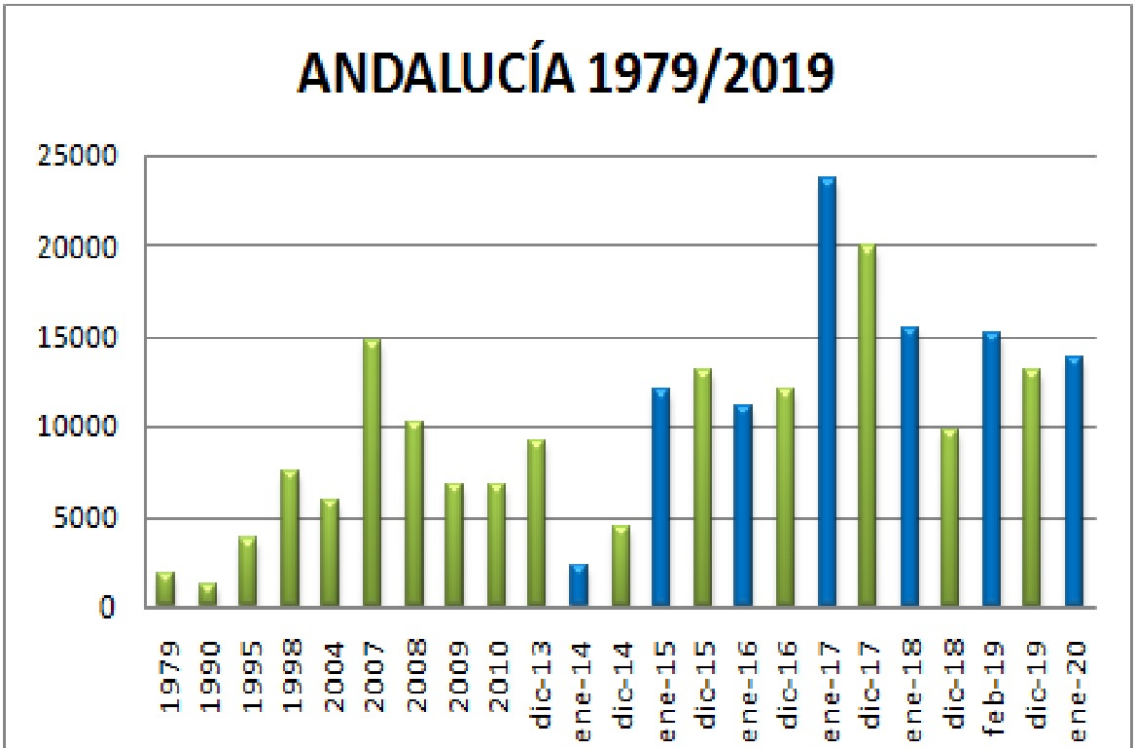
A significant decrease can be seen between 2010 and 2013, which could be down to fewer birds or the census dates, when many cranes could still have been in the Central Zone of Extremadura. The most variable figures are from Córdoba province, while the other provinces are usually quite stable (Graphic no. 12).

By province, the most important are Sevilla and Córdoba. The majority of those in Sevilla are in Doñana National Park. They are also present at the Lentejuela lagoons, Carmona, Osuna and the Bucaré and Las Monjas dehesas of Alcalá de Guadaira. Within Córdoba, birds are distributed through the Los Pedroches Valley and Alto Guadiato in the north of the province.

Next comes Málaga province with just one location, the Fuente de Piedra lagoon (although a few may may roost at Dulce lagoon, Antequera). In Huelva (which also hosts birds from Doñana) the cranes usually use the Tinto and Odiel rivers for roosting. In Granada, specifically in the Baza depression, there is a small nucleus of 7 birds in each census. Four birds appeared in December in the Andarax estuary in Almeria, which were migrants but were included because they occurred on the census dates. (Figure no. 11).

The Andalucian population of cranes is relatively stable, although the Córdoba population fluctuates most due to its proximity to the Central Zone of Extremadura, which may influence the number of wintering birds from year to year, or even within the same winter. The dehesas of Los Pedroches are very mature, with very little renewal, which could be a handicap for the species in the future.

The future for the Baza nucleus is unpromising, due to the significant transformation of the area with irrigated crops. The number of hectares dedicated to intensive olive growing is increasing in the area around Fuente de Piedra, so this population could decrease.




Graphic no. 12: Evolution of wintering cranes in Andalucía, from 1979 to 2019. January censuses in blue.


Figure no.11: Crane wintering locations in Andalucía

## Census methodology

In the first "Grus" project, up to 6 surveys were organized and the following projects continued with this methodology of several censuses during the winter (generally November, December, January and February). In 2004 and2007 only one census was done and since 2013 we have carried out two systematic censuses (December and January). Generally in December there are still cranes arriving in the peninsula, while January is a fully a winter month and usually without new crane arrivals from France.

Censuses are not organized for Sundays or festive days, which are hunting days, when the birds are more nervous and are continually moving around, even changing roost site if there is too much disturbance. They are usually done at sunset, coinciding with cranes´ arrival at the roost sites. Since 2013 they have also been done in feeding areas is some complex areas with many birds.

Cranes are gregarious and follow routines, so in the mornings they disperse in groups of varying size (depending on the size of the wintering population), and then re-group in the afternoon, sometimes establishing "pre-roosts" then set off for the places chosen for roosting, which are in wetlands (lagoons, rivers, streams, reservoirs, crop fields, flooded stubbles, farm ponds etc.), where the majority of birds in the area gather, using the same access routes each day, although these will change as the feeding areas change during the winter. In particularly rainy winters, this routine may change due to the availability of suitably flooded areas, breaking up the flocks and multiplying the roost sites, even roosting in the feeding area if this is flooded.

In areas with a great number of wintering birds there may be several roost sites within the same wetland, such as reservoirs, making it necessary to divide the census team.

Currently censuses are done at sunset, when birds enter the roost, at dawn, when birds are leaving the roost, and during the day in feeding areas. In some areas it is necessary to combine the roost census with the feeding census to obtain a reliable estimate of the number of cranes. Here is an explanation of the methodology for the roost census and the feeding area census.

1-At roost sites.

Previous visits are made for locating nocturnal concentration or roost sites and the routes used each day to access them. Although cranes are usually faithful to them, year after year, these may change due to disturbances, disappearance of flooded areas or the appearance of other wetlands (natural or otherwise), so at least one previous visit should be done before the census, to study the landscape and choose the highest observation point closest to the roost site to facilitate counting and detecting the flocks. It is not advisable to be too close to be able to make a good count, and avoid a massive arrival with little light.

If counting in the late afternoon, it is necessary to be at the observation point at least 2 hours before sunset. At reservoirs with perimeter roads there are frequently disturbances in the final hour, caused by people or vehicles using them, so the birds may delay their arrival by staying at the pre-roost site until all is quiet, or even change their rest site at the last moment.

This census can also be done at dawn, when all the birds that have roosted are generally present, so these are the most complete censuses, although at times at locations with very many birds, the departure can be simultaneous and not staggered (as the afternoon arrival), which can make the counting difficult. Early morning fog is another factor to take into account, which can make the census difficult, or even impossible. The observer´s criteria determine the choice of what time to census.

2-In the feeding habitat.

An exclusively day-time census, used in especially open areas, with little relief, good visibility and few obstacles and where birds are easily detected, in stubble (maize, rice, cerals etc.) and/or pastures, counting the flocks or families. A route is designed and covered on a previous visit, which allows an exhaustive census. It requires more time, and the person is continually moving in their vehicle. You begin after dawn, once the birds have dispersed throughout the area, and you try to finish before mid –morning, as this is when they usually re-group at preening and collecting points, and then disperse again through the feeding area. This method is used in the Central Zone of Extremadura, as there are a great number of birds and many roosting sites exist (some very close to each other), and frequent changes occur depending on the feeding requirements, local disturbances or the quantity of flooded areas (even from one day

to the next). This method could be very useful too in some areas of Aragón and Navarra, which have similar characteristics to this area of Extremadura.

In localities with small areas used by cranes and with few birds, a roost census can be done, complementing it with an earlier one in the feeding area, with the aim of comparing and complementing the evening count, covering the feeding areas and counting birds early in the afternoon and then getting to the observation point to count the arrival at the roost. This can also be done by counting the roost at dawn, followed by a journey for counting in the feeding areas during the morning. This is always more complete than just counting at the roost.

As well as counting the birds that spend the winter in our latitudes, the objective of the census is to know the general distribution of this species in the territory. It also allows us to know at first hand the conservation state of the cranes´ feeding and resting habitats, as well as the problems.

-Periodicity and scope: the importance of the Iberian population recommends carrying out two state-wide censuses each year, at least, with continual monitoring of all the nuclei, in coordination with Portugal and also with Morocco. The species is continually monitored in France and Germany.

-Participation**:** Covering and counting more than 350 localities demands a significant effort, and more than 370 people participate in each census (see listing). The networks and media available now facilitate this work, in addition to the enthusiasm of the participants. It is necessary to maintain good contact and provide continually updated information. We produce a report of the wintering and migration each season, which is shared with everyone that took part, and it is available on the Grus Extremadura website in Spanish and English.

-Census dates: We recommend doing a census in the second or third week of December and another in the third week of January. In December there are still cranes arriving in the peninsula, or are transiting it, so we advise doing the first after the second week, better if in the third week, although other external factors influence this, such as Christmas festivities. Regarding January, with the aim of having a gap of 4 or 5 weeks between the censuses, we recommend doing it from the third week, trying to avoid the last week, as migration may have already started and the results may not be entirely accurate. As far as possible, it is not advisable to carry out the censuses during the full moon phase (Fernández Cruz 2005, Alonso *et al* 1985), but if they are done in the morning the moon´s phase is not so decisive.

-Times: We recommend the roost censuses are done in the morning, although this is always at the observer´s discretion and depends on meteorological conditions, such as fog or rain. Regarding those done in the feeding areas, we recommend they are done early in the morning, once the cranes have moved to the feeding areas, aiming to finish them before mid-day, when cranes start to move again, to join up at resting and preening areas.

With this method of two annual censuses, a quite realistic image of each winter is obtained in a short period of time, with a gap of five weeks that allows us to check the species´ intra-winter movements. Clearly, censuses can be done fortnightly between 15 November and 1 February if there is a great interest to know a nucleus, but this effort is difficult to achieve with so many collaborators, not just each year but every five or more years, as it requires a dedication that cannot be assumed for everyone.

Another of the objectives is to know the feeding areas and the changes within them, changes that today are rapid and devastating, able to finish off irreversibly a favourable area in a few days. Also, of course, we can have first-hand information of accidents and deaths.

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